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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/757,490

Applicant(s)

MORAVEC ET AL.

Examiner

CLIFTON G. DALEY

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 9 and 11-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9, 11-16 and 19-22 is/are rejected.
- 7) ☒ Claim(s) 17 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claim 22 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 22 defines a "system". However, while the preamble defines a "system", which would typically be indicative of an "apparatus", the body of the claim lacks definite structure indicative of a physical apparatus. Furthermore, the specification indicates that the invention may be embodied as pure software page 19, paragraph [0084]. Therefore, the claim as a

whole appears to be nothing more than a "system" of software elements, thus defining functional descriptive material per se.

Functional descriptive material may be statutory if it resides on a "computer-readable medium or computer-readable memory". The claim(s) indicated above lack structure, and do not define a computer readable medium and are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests:

1. Amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory; or
2. Adding structure to the body of the claim that would clearly define a statutory apparatus.

Any amendment to the claim should be commensurate with its corresponding disclosure.

Note:

"A transitory, propagating signal ... is not a "process, machine, manufacture, or composition of matter." Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter." (*In re Petrus A.C.M. Nuijten*; Fed Cir, 2006-1371, 9/20/2007).

Should the full scope of the claim as properly read in light of the disclosure encompass non-statutory subject matter such as a "signal", the claim as a whole would be non-statutory. Should the applicant's specification define or exemplify the computer readable medium or memory (or whatever language applicant chooses to recite a computer readable medium equivalent) as statutory tangible products such as a hard drive, ROM, RAM, etc, **as well as** a non-statutory entity such as a "signal", "carrier wave", or "transmission medium", the examiner suggests amending the claim to include the disclosed tangible computer readable storage media, while at the same time excluding the intangible transitory media such as signals, carrier waves, etc.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1, 5-7, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo et al. (Hereinafter "Guo": Ping Guo and Michael R. Lyu, "A Study on Color Space Selection for Determining Image Segmentation and Region Number",

Proceedings of the international Conference, IC-AI 2000, CSREA Press, Athens, GA, USA, Vol.3, pp. 1127-1132, June 2000) in view of Reavy et al. (US 6,788,308 B2).

Regarding claims 1 and 22, Guo teaches a method and analogous system for automatically determining a foreground color for a digital image, comprising:

(a) automatically dividing the colors of the pixels of at least a part of the digital image into a number of color clusters in a color space **(see Abstract)**;

(b) automatically segmenting the part of the digital image into regions according to the color clusters **(§ 1, ¶ 1 and § 3, ¶ 3)**.

Guo does not teach the limitation of (c) automatically grouping the color clusters into interference clusters comprising a pixel in a selected region of the image and benign clusters comprising no pixel in the selected region.

Reavy discloses a method for determining a foreground color for an image comprising:

(c) automatically grouping the color clusters into interference clusters comprising a pixel in a selected region of the image and benign clusters comprising no pixel in the selected region **(column 2, lines 21-23, i.e. area covered by text versus area not covered by text)**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use Reavy's grouping method in Guo's system in order to improve readability of text **(Reavy: column 1, lines 39-40)**.

Guo combined with Reavy teaches the method above comprising:

(d) automatically selecting a color being related to all interference clusters according to predetermined criteria (**Reavy: column 2, lines 7-14**); and

(e) one of automatically displaying, storing and communicating data representing the selected foreground color (**Reavy: Fig. 4, Display Monitor 26**).

Regarding claim 5, Guo combined with Reavy teaches the method according to claim 1, wherein said dividing at (a) comprises converting the image data to a predetermined color format (**Guo: § 2.4, ¶ 2**).

Regarding claim 6, Guo combined with Reavy teaches the method according to claim 1, wherein said dividing at (a) comprises using an Expectation-Maximization clustering (**Guo: § 2.1**).

Regarding claim 7, Guo combined with Reavy teaches the method according to claim 1, wherein said dividing at (a) comprises determining the number of clusters using a model selection method one of a Bayesian Information Criterion and a Universal Model-based Minimum Description Length Principle (**Guo: § 2.3, i.e. Bayesian Probabilistic Classification**).

Regarding claim 21, Guo combined with Reavy teaches the method according to claim 1, further comprising one of displaying and storing a predetermined object using the selected foreground color together with the digital image (**Guo: § 3 and Fig. 1**).

4. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy as applied to claim 1 above, in view of Hamlin et al. (Hereinafter "Hamlin": US 5473738), and further in view of Sandow (US 5909220).

Guo combined with Reavy teaches the method according to claim 1. Guo combined with Reavy does not teach the limitation wherein said selecting at (b) further comprises: selecting a harmonious color set with respect to the color clusters.

However, Hamlin discloses a method wherein said selecting at (b) further comprises: selecting a harmonious color set with respect to the color clusters (**Column 1, lines 9-12**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Hamlin's harmonious color selecting method with the Guo/Reavy foreground color determining method, the motivation being to produce a pleasing effect to the eye (**Hamlin: column 2, lines 25-27**).

Guo combined with Reavy and Hamlin does not teach the limitation wherein said selecting at (b) further comprises testing the harmonious color set for legibility.

However Sandow discloses a method wherein said selecting at (b) further comprises testing the harmonious color set for legibility (**column 17, lines 25-29**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Sandow's legibility testing method with the above combined teaching of Guo, Reavy and Hamlin, the motivation being to control the legibility of lettering (**Sandow: Column 3, lines 30-34**).

5. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy, Hamlin and Sandow as applied to claim 2 above, and further in view of You et al. (Hereinafter "You": J. You, E. Pissaloux, H. A. Cohen, "A Hierarchical Image Matching Scheme Based on the Dynamic Detection of Interesting Points", International Conference on Speech and Image Processing, 1995, Vol. 4, pp. 2467-2470).

Regarding claim 3, Guo in combination with Reavy, Hamlin and Sandow teaches the method according to claim 2, as disclosed above, wherein said testing the harmonious color set for legibility further comprises: computing local measures of contrast between background and foreground in a neighborhood of a predetermined foreground region **(Sandow: column 19, lines 1-8 and Fig. 12, background 65 in a neighborhood of foreground 64)**.

Guo in combination with Reavy, Hamlin and Sandow does not teach the limitation wherein said testing the harmonious color set for legibility further comprises computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

However, You discloses computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region **(page 2468, § 2.1 and § 3, ¶ 2, i.e. computing the Hausdorff distance (legibility score) using only the "interesting points" over the foreground region)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine You's computing method with the above combined teaching of Guo, Reavy, Hamlin and Sandow, the motivation being to decrease computation time (**You: § 3, ¶ 1**).

Regarding claim 4, Guo in combination with Reavy, Hamlin and Sandow teaches the method according to claim 2, wherein the foreground color is selected according to a legibility criterion for a predetermined foreground region by: computing local measures of contrast between background and foreground in a neighborhood for a predetermined foreground region (**Sandow: column 19, lines 1-8 and Fig. 12, background 65 in a neighborhood of foreground 64**).

Guo in combination with Reavy, Hamlin and Sandow does not teach the limitation of computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

However You discloses computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region (**page 2468, § 2.1 and § 3, ¶ 2, i.e. computing the Hausdorff distance (legibility score) using only the "interesting points" over the foreground region**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine You's computing method with the above combined teaching of Guo, Reavy, Hamlin and Sandow, the motivation being to decrease computation time (**You: § 3, ¶ 1**).

6. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy as applied to claim 1 above, in view of Shi et al. (Hereinafter "Shi": Jianbo Shi and Jitendra Malik, "Normalized Cuts and Image Segmentation", 2000, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 22, No. 8, pp. 888-905).

Guo combined with Reavy teaches the method according to claim 1.

Guo combined with Reavy does not teach the limitation wherein the segmenting comprises using one of a normalized cut criterion and an energy-minimization method.

However, Shi discloses a segmentation method using one of a normalized cut criterion and an energy-minimization method (**See Abstract**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Shi's criterion with the Guo/Reavy teaching, the motivation being to measure the goodness of an image segment (**Shi: page 889, left column, lines 6-8**).

7. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy as applied to claim 1 above, in view of Sandow.

Guo combined with Reavy teaches the method according to claim 1.

Guo combined with Reavy does not teach the limitation wherein the foreground color is selected according to a legibility criterion for a predetermined foreground region.

However, Sandow discloses a method wherein the foreground color is selected according to a legibility criterion for a predetermined foreground region (**column 6, lines 55-60**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Sandow's legibility testing method with the above teaching of Guo, the motivation being to control the legibility of lettering (**Sandow: Column 3, lines 30-34**).

8. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy and Sandow as applied to claim 11 above, in view of Gatica-Perez (Hereinafter "Gatica-Perez": Daniel Gatica-Perez, Zhi Zhou, Ming-Ting Sun and Vincent Hsu, "Video Object Hyper-Links for Streaming Applications", 2002, Springer-Verlag Berlin Heidelberg, VISUAL 2002, LNCS 2314, pp, 229-238).

Guo in combination with Reavy and Sandow teaches the method according to claim 11.

Guo in combination with Reavy and Sandow does not teach the limitation wherein the foreground color is selected based on a likelihood ratio of the hypothesis that the digital image contains the foreground region and the hypothesis that the digital image does not contain the foreground region.

However, Gatica-Perez discloses a method wherein the foreground color is selected based on a likelihood ratio of the hypothesis that the digital image contains the

foreground region and the hypothesis that the digital image does not contain the foreground region (**page 232 and Fig. 2**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Gatica-Perez's color selection method with the above combined teaching of Guo, Reavy and Sandow, the motivation being to reduce the search space for segmentation (**Gatica-Perez: § 2.3, ¶ 1, lines 1-3**).

9. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Sandow, in view of Gatica-Perez as applied to claim 12 above, and further in view of You.

Guo in combination with Reavy and Sandow and further in view of Gatica-Perez teaches the method according claim 12.

Guo in combination with Reavy and Sandow and further in view of Gatica-Perez does not teach the limitation wherein selecting the foreground color comprises computing the legibility of $\frac{1}{11} \min_x T \max_y C^2 r(x+y)$, wherein $r(x) = h \log \Pr(I(x) | T) \Pr(I(x) | B)$, $C \cdot \text{sub} \cdot \epsilon \cdot \sup \cdot 2$ is a disc of radius ϵ and wherein $\Pr(I(x) | T)$ denotes heuristic or other models of likelihoods that the image I contains text T at a given pixel x and $\Pr(I(x) | B)$ denotes heuristic or other models of likelihoods that the image I contains background B at the given pixel x .

However, You discloses a method wherein selecting the foreground color comprises computing the legibility of $\frac{1}{11} \min_x T \max_y C^2 r(x+y)$, wherein $r(x) = h \log \Pr(I(x) | T) \Pr(I(x) | B)$, $C \cdot \text{sub} \cdot \epsilon \cdot \sup \cdot 2$ is a disc of radius ϵ

and wherein $\Pr(I(x) \cdot \text{vertline} \cdot T)$ denotes heuristic or other models of likelihoods that the image I contains text T at a given pixel x and $\Pr(I(x) \cdot \text{vertline} \cdot B)$ denotes heuristic or other models of likelihoods that the image I contains background B at the given pixel x **(page 2468, § 2.1 and § 3, ¶ 2, i.e. computing the Hausdorff distance (legibility score) using only the “interesting points” over the foreground region, and using Gatica-Perez’s likelihood ratio disclosure (Gatica-Perez: page 232 and Fig. 2))**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine You’s computing method with the above combined teaching of Guo, Reavy, Sandow and Gatica-Perez, the motivation being to decrease computation time **(You: § 3, ¶ 1)**.

10. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy as applied to claim 1 above, in view of Hamlin.

Regarding claim 14, Guo combined with Reavy teaches the method according to claim 1. Guo combined with Reavy does not teach the limitation wherein the foreground color is selected according to a color harmony criterion.

However, Hamlin discloses a method wherein the foreground color is selected according to a color harmony criterion **(column 1, lines 9-12)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Hamlin’s harmonious color selecting method with the

Guo/Reavy foreground color determining method, the motivation being to produce a pleasing effect to the eye (**Hamlin: column 2, lines 25-27**).

Regarding claim 15, Guo in combination with Reavy and Hamlin teaches the method according to claim 14, wherein the foreground color is selected according to at least one of a monotonic, a complementary, and a p-adic color harmony criterion in HSL space (**Hamlin: column 4, lines 25-27**).

Regarding claim 16, Guo combined with Reavy teaches the method according to claim 14, wherein the foreground color is selected according to a color harmony criterion with respect to at least one interference cluster (**Reavy: column 2 lines 9-14, i.e. background color as determined by Guo's clustering method**).

11. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guo combined with Reavy as applied to claim 1 above, in view of Hamlin, and further in view of Sandow.

Regarding claim 19, Guo combined with Reavy teaches the method according to claim 1. Guo combined with Reavy does not teach the limitation wherein said selecting at (d) comprises determining a color subset according to a color harmony criterion and maximizing a legibility function in the color subset.

However, Hamlin discloses a method wherein said selecting at (d) further comprises selecting a harmonious subset according to a color harmony criterion (**column 7, lines 19-22**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Hamlin's harmonious color selecting method with the Guo/Reavy foreground color determining method, the motivation being to produce a pleasing effect to the eye **(Hamlin: column 2, lines 25-27)**.

Guo combined with Reavy and Hamlin does not teach the limitation wherein said selecting at (d) further comprises maximizing a legibility function in the color subset.

However Sandow discloses a method wherein said selecting at (d) further comprises maximizing a legibility function in the color subset **(column 17, lines 25-29 and column 36, lines 36-49, i.e. selecting color subset for maximum legibility slider value)**.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Sandow's legibility maximization method with the above combined teaching of Guo, Reavy and Hamlin, the motivation being to control the legibility of lettering **(Sandow: Column 3, lines 30-34)**.

Regarding claim 20, Guo combined with Reavy, Hamlin and Sandow teaches the method according to claim 1 and the harmonious color selection method (i.e. function) and legibility maximization function as recited in claim 19 above.

Guo combined with Reavy, Hamlin and Sandow does not disclose the limitation wherein the foreground color c is selected for which $13 \ i = 1 \ M \ 1 \ l \ (\ c \ , \ P \ i \) + k = 1 \ N \ k$ $h \ (\ c \ , \ K \ k \)$ is maximal, wherein c denotes the foreground color, $P.sub.i$ denote the interference clusters, $K.sub.k$ denote all clusters, both benign and interference, l is a

legibility function in color space, h is a color harmony function, and α_i and γ_k are weighting factors.

However, the examiner takes official notice that maximizing a weighted sum was notoriously well known in the art at the time of the invention.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to maximize a weighted sum comprising the Guo/Reavy/Hamlin harmonious color selection function and Sandow's legibility maximization function, the motivation being to combine optimization of a pleasing effect to the eye (**Hamlin: column 2, lines 25-27**) and the legibility of lettering (**Sandow: Column 3, lines 30-34**).

Summary of Applicant's Remarks: Lovelady does not teach features related to "selecting a foreground color related to an interference cluster", as now recited in claim 1.

Examiner's Response: Applicant's argument is moot in view of the new grounds of rejection applied to claim 1 above.

Allowable Subject Matter

12. Claims 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLIFTON G. DALEY whose telephone number is 571-270-3144. The examiner can normally be reached on Monday - Friday 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Samir Ahmed
Examiner
Art Unit 2624

Art Unit: 2624

/Samir A. Ahmed/

Supervisory Patent Examiner, Art Unit 2624